INJURIES, ILLNESSES, AND HAZARDOUS EXPOSURES IN THE MINING INDUSTRY, 1986-1995: A SURVEILLANCE REPORT

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Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health
Washington, DC

May 2000

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FOREWORD

This publication represents the first comprehensive surveillance report on injuries and illnesses in the U.S. mining industry. The tracking of occupational injuries, illnesses, and hazards, documents the Nation's progress in reducing the burden of work-related diseases and injuries and may help identify old and new problems that require additional research and prevention efforts. It is through surveillance data that we have been able to document that during the 20th century, deaths in the mining industry dropped approximately 37-fold and injury fatality rates have decreased approximately 13-fold, to 25 per 100,000 during 1996-1997. Much of this success can be attributed to research, which led to workplace interventions (such as safer equipment and improved ventilation), and regulations. Despite the progress that has been made in reducing the death and injury toll in mining, much work remains to be done.

The National Institute for Occupational Safety and Health is now the only federal agency with a mandate to conduct research and prevention activities for all the nation's workers, including the vital mining workforce. There are many challenges facing NIOSH in the field of mine safety and health in the new millennium. Traditional causes of injuries and fatalities and the potential for underground disasters still exist in U.S. mines today. For example, mine roof collapses account for a large portion of underground deaths and injuries. Respirable coal mine dust, which can lead to "black lung" disease, and harmful noise levels remain persistent health concerns. In addition, the introduction of new mining technologies may create new hazards not yet recognized in the field.

NIOSH is well positioned to meet these challenges and will continue to draw on its strong background of research, partnership, and prevention coupled with solutions-oriented engineering expertise. NIOSH will aggressively continue to develop the science and technology necessary to protect the safety and health of U.S. mine workers into the 21st century.

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ACKNOWLEDGMENTS

This report was prepared primarily by Deborah D. Landen, Barbara Fotta, Richard C. Wang, Barbara D. Makowski, and Robert J. Tuchman of the Office for Mine Safety and Health Research, Pittsburgh Research Laboratory, and by Larry A. Layne of the Division of Safety Research, NIOSH.

Ted Lowe of the Office for Mining Safety and Health Research, Spokane Research Laboratory, and E. William Rossi of the Pittsburgh Research Laboratory created the maps. Janet M. Hale of the Division of Respiratory Disease Studies contributed analyses of occupational respiratory sampling data. Carol A. Burnett of the Division of Surveillance, Hazard Evaluations, and Field Studies contributed analyses of death certificate data. Lynette K. Hartle and Pamela K. Schumacher of the Division of Surveillance, Hazard Evaluations, and Field Studies, and Linda H. Plybon of the Education and Information Division assisted with coding of Mine Safety and Health Administration job titles into U.S. Bureau of the Census groupings. Lynn L. Rethi and Michael J. Brnich, Jr., of the Office for Mine Safety and Health Research, Pittsburgh Research Laboratory, assisted with classification of miners' work activities.

ABBREVIATIONS

ANSI	American National Standards Institute
BLS	U.S. Bureau of Labor Statistics
BOC	U.S. Bureau of the Census
CFOI	Census of Fatal Occupational Injuries
CFR	Code of Federal Regulations
CI	confidence interval
CPS	Current Population Survey
dB	decibel(s)
dBA	decibel(s), A-weighted
hr	hour(s)
ICD	International Classification of Disease
ISO	International Organization for Standardization
kHz	kilohertz
L/min	liter(s) per minute
lb	pound(s)
mg	milligram(s)
mg/m^3	milligram(s) per cubic meter
MIPS	Mining Industry Population Survey
MRE	Mines Research Establishment
MSHA	Mine Safety and Health Administration
NCHS	National Center for Health Statistics
NEC	not elsewhere classified
NIOSH	National Institute for Occupational Safety and Health
NOHSM	National Occupational Health Survey of Mining
NOMS	National Occupational Mortality Surveillance
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PMR	proportionate mortality ratio
SIC	Standard Industrial Classification
U.K.	United Kingdom
USBM	U.S. Bureau of Mines

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Occupational Illnesses

Occupational Exposures

INTRODUCTION

This surveillance report summarizes data on work-related fatal and nonfatal injuries, illnesses, and hazardous exposures in the mining industry for the 10-year period 1986-1995. The term "surveillance," as used in public health, may be new to many readers of this report. With regard to occupational safety and health, the goal of surveillance is to describe the occurrence of work-related injuries, illnesses, and known hazardous exposures; to identify new hazards that may occur due to the introduction of new technology or other factors; and to assess the effects of preventive measures designed to improve worker safety and health. Surveillance provides an overall picture, which can be used to focus resources on areas most in need of prevention programs or further research.

Surveillance generally requires the use of multiple sources of data, all of which have their own strengths and limitations. Surveillance in the U.S. mining industry is complicated by the fact that U.S. national data systems that provide information on mining are based on *two different definitions of the mining industry*. One is established by the Mine Safety and Health Administration (MSHA), the other by the Standard Industrial Classification (SIC) System [Office of Management and Budget 1987] and the 1980 U.S. Bureau of the Census (BOC) Classification System [U.S. Bureau of the Census 1982].

The mining industry as defined by MSHA is based on the regulatory jurisdiction of that agency. Reporting requirements for injuries, illnesses, and workplace exposures are stipulated under the Federal Coal Mine Health and Safety Act of 1969 and the Federal Mine Safety and Health Amendments Act of 1977. Of note is that the oil and gas extraction industry falls outside of MSHA jurisdiction. The Occupational Safety and Health Administration (OSHA) was charged with enforcement in the oil and gas industry under the Occupational Safety and Health Act of 1970.

Under the SIC, the definition of mining covers the extraction of naturally occurring minerals, including liquids (petroleum), gases (natural gas) and solids (coal, metal, and nonmetallic minerals). Exploration and development of mineral properties are also included in the SIC definition of the mining industry. The SIC was developed by the Office of Management and Budget for use in classifying establishments based on the type of economic activity in which they are engaged and serves as the industry classification standard for all establishment-based Federal economic statistics. This classification is important for occupational safety and health surveillance because it also serves as the industry classification system for all data on work-related injuries and illnesses collected by the U.S. Bureau of Labor Statistics (BLS).

The U.S. Bureau of the Census uses an industry coding scheme similar to that used by the SIC. For the mining industry, the categorization is identical in both systems. Death certificate data made available by the National Center for Health Statistics (NCHS) are categorized under this system. Death certificate data are particularly important for surveillance of mortality from work-related illnesses.

Key differences between the SIC/BOC categorization system and the MSHA system can be summarized as follows:

- MSHA excludes the oil and gas industry, which is classified as part of the mining industry under SIC/BOC.
- MSHA excludes work that is done off of mine property; work off of mine property is included under SIC/BOC if it is performed by an establishment falling into one of the SIC/BOC mining industry codes.
- MSHA includes mine-associated mills and processing plants; these are classified under the manufacturing industry, rather than mining, according to the SIC/BOC coding structure.

Since the data collected by MSHA and the data collected by BLS and NCHS using the SIC/BOC classification system are both important sources of information on the mining industry and in many cases serve different purposes, data from both systems are presented in this report. In general, data using the SIC/BOC system are comparable across U.S. industries and should be used when comparing mining to other U.S. industries.

Much of the data in this report are presented in the form of frequencies or rates. A frequency provides only a count of the number of cases without providing any information about the risk of occurrence. Rates provide an estimate of the risk of injury or illness. *The reader is cautioned, however, that rates based on small numbers can be unstable; thus, any inferences should be drawn with care.* In this report, no rates are presented for groups in which there were fewer than three cases.

The incidence of most injury and illness conditions differs by age, sex, and race. For this reason, data in many surveillance reports are adjusted for these demographic factors. It was not possible to do this for most of the rates in this report because information on demographics was not available. With the exception of the proportionate mortality ratios (PMRs), all data presented are unadjusted.

A detailed account of the sources of data is in appendix A. The methods used in data selection and analysis are described in appendix B.